NOTES ON MISCELLANEOUS ENDOPARASITES.

By
T. Harvey Johnston. M.A., D.Sc., F.L.S., Biology Dept., University, Brisbane.

(*Read before the Royal Society of Queensland, 25th November*, 1918).

Cestoda.

Acanthotaenia gallardi Johnston.

Last year this cestode was found infesting the mid-region of the intestine of a black snake, *Pseudechis porphyriacus*, killed by Mr. Munro Hull at Eumundi. In addition to this parasite, larval cestodes (*Sparganum* sp.) were found just under the peritoneum of the body cavity. In company with *A. gallardi* there were numerous isolated individuals of a strongyle, *Diaphanocephalus* (*Kalicephalus*) sp. distributed throughout the greater part of the intestine, while the œsophagus and stomach harboured many *Physaloptera*. No entozoa had been previously reported from this host in Queensland.

Moniezia trigonophora St. & Hass.

This tapeworm was found in January 1918, in numbers in a lamb at Eumundi. It had not been previously reported from Queensland.

Multiceps multiceps Leske.

Dr. Dodd (1918, p. 502) in a recent address on endoparasites of live stock referred to the parasite and made a statement that "the condition Gid is not common in N.S.W."

I have not been able to obtain any records of authentic cases of the occurrence of the gid bladder worm, generally known as *Cœnurus cerebralis*, in any part of Australia, all cases of so-called gid being traceable to other causes.

Since Dr. Dodd's remarks would seem to imply that the parasite occurs in N.S.W., I wrote asking for further information. In reply he stated that he had not personally met with a case of Gid in that State, but had been informed that it had been seen there and occasionally in Melbourne. He went on to say, though proof is necessary before the statement can be accepted as conclusive, that he is not prepared to state that Gid does not exist in N.S.W., because the causal parasite has not been demonstrated. He mentioned that he had examined large numbers of sheep all over that State without having encountered a case. In a later letter he agreed that it was quite possible that persons had confused other conditions and Gid, and believed that some of the cases mistaken for gid were probably due to the presence of *Echinococcus* hydatids in the cranial cavity.

In view of the evidence given by Dr. Dodd, as well as that which I have collected, we cannot at present affirm the occurrence of *Multiceps multiceps* in Australia. It must be struck off the list of entozoa actually known as occurring in this continent.*

Tænia hydatigena Pall.

The occasional presence of the bladder worm stage (*Cysticercus tenuicollis*) in pigs in south-eastern Queensland is now noted for the first time.

*In the same paper (p. 506) Dr. Dodd refers to the presence of *Trichostrongylus axei* (*Strongylus gracilis*) and other stomach worms in Australian sheep and cattle. (See also Dodd, Ann. Rep. Dept. Agric. Q'land, 1909, p. 93-4, where he calls it *Str. gracilis*). Cobbold (Parasites, etc., 1879, p. 283) gave the name *Strongylus axei* to certain minute nematodes occurring in the mucous membrane of the stomach of donkeys. Railliet and Henry (C. R. Soc. Biol., 66, 1909, p. 87) placed *S. gracilis* McFad. and *S. extenuatus* Raill. as synonyms of *Tricho. axei* Cobbold. Ransom in his fine account of the nematodes occurring in the alimentary tract of sheep, cattle, etc. (Bull. 127, U.S. Dept. Agric., B.A.I., 1911, p. 94) referred to *S. gracilis* McF. as a synonym of Railliet's *Tricho. extenuatus*, making no mention of *Tr. axei* as a parasite of stock—apparently not accepting Railliet's views. Leiper (Jour. London Sch. Trop. Med., 1 (1), 1911, p. 25) in his check list, mentioned *Tr. axei* as a parasite of Equidæ and (*l.c.* 1 (2), 1912, p. 116) queried its presence in cattle. In my census of Queensland endoparasites (1916) I referred to Dodd's record of *Str. gracilis* as *Tr. extenuatus* Raill, following Ransom (1911) rather than Railliet (1909). In view of these remarks *Tr. axei* cannot yet be added to our known helminth fauna unless it be admitted that the two names *Str. axei* Cobbold and *S. gracilis* McFadyean (not Lenckt `are synonymous.

Dipylidium caninum L.

As evidence of the rapidity with which some entozoa can reach maturity it may be of interest to mention that I found specimens of this cestode as well as the nematode *Toxascaris canis*, in full egg-bearing in a puppy only six weeks old (Sydney, September, 1909).

Trematoda.

Bird Trematodes.

In some of my lists of parasites of Australian birds reference was made to the presence of certain trematodes under the broad generic names *e.g. Echinostomum*, *Monostomum*, etc. The flukes were submitted to my friend, Prof. S. J. Johnston, of Sydney University, who described them, along with others, in his paper on the Trematodes of Australian Birds (1916).

They are as follows :—

Host.	Locality.	Parasite.
Numenius cyanopus	Gladstone, Q.	*Echinostoma* J., 1912, 1916,= *Himasthla harrisoni* S.J.J.
Himantopus leucocephalus	South Australia	*Monostomum* J., 1910. 1912,= *Hæmatotrephus adelphus* S. J. J.
Charadrius dominicus	Sydney	*Echinostoma* J., 1910, = *Acanthoparyphium spinulosum* S. J. J.
Herodias timoriensis	Eidsvold, Q.	*Echinostoma* J., 1912 = *Echinoparyphium oxyurum* S .J. J. & *Patagifer fraternus* S. J. J.
Ibis molucca	Eidsvold, Q.	*Echinostoma* J., 1912 = *Patagifer acuminatus* S. J. J
Chenopsis atrata	Victoria	*Monostomum* J., 1910, 1912 = *Hyptiasmus magnus* S. J.J.
Micræca fascinans	Eidsvold, Q.	*Echinostoma* J., 1912 = *Echinoparyphium harveyanum* S. J. J.

Dolichopera macalpini Nicoll.

This trematode was originally described (but not named) by Macalpine (1891, p. 40) from the copper-headed snake, *Denisonia superba* in Victoria. Nicoll included the species (which he named) in his genus *Dolichopera* (1914, p. 343), and in 1918 gave a description of the species mentioning as hosts, the tiger snake *Notechis scutatus* (Victoria), the

copperheaded snake, *Denisonia superba* (Victoria) and an unnamed snake collected by Dr. J. B. Cleland* on Flinders Island (1918a). Quite recently he referred briefly to the parasite and published a figure illustrating its anatomy (1918b, p. 374).

I obtained *D. macalpini* from the œsophagus of *Denisonia superba* and the black snake *Pseudechis porphyriacus* in Sydney district, recording its presence under the name *Hemiurus* (*Apoblema*) sp. (1910a, 1911). This parasite of venomous snakes seems to be fairly widely distributed in Eastern Australia.

Echinochasmus tenuicollis S. J. Jnstn.

Recently described by S. J. Johnston, (1916, p. 206) from a cormorant, *Phalacrocorax melanoleucus*, Tuggerah, N.S.W. I have identified as belonging to this species a few trematodes collected from the same host species near Longreach, Thompson River, by Miss M. J. Bancroft (August, 1918). In my specimens the vitellaria extend further forwards, reaching the posterior edge of the ventral sucker, while the male and female glands are relatively more remote from the hinder end of the animal, being situated nearer the ventral sucker than shown in the original figure.

Schistosomum spp.

Some time ago reference was made to the likelihood of human blood flukes being introduced into Australia by returning troops from Egypt and neighbouring countries (Johnston, 1916, p. 37). In 1917 urine from returned soldiers in Queensland, submitted to me for examination, was found to contain *Bilharzia* ova. Most specimens possessed terminal spines (*S. haematobium* Bilh.) but occasional lateral-spined eggs (*S. mansoni* Sambon) were present in addition. Thus both species of human blood fluke are at present in this State. It is not unlikely that under certain conditions these may become endemic. One species, presumably *S. haematobium* on account of its South African origin, has become established in one locality in West Australia. Major Cherry gave an interesting summary in his article on Bilharziosis (1917).

*Dr. Cleland has informed me that the snake was *Notechis scutatus*.

Capt. Lawton recently published an account of the early clinical features of the serious disease caused by *S. mansoni* (1917, p. 21). He found lateral-spined ova in stools of a number of Australian soldiers in a Cairo Military Hospital. In addition to the ova, the fæces were found, in some cases, to contain other parasites such as *Entamoeba coli*, *Trichomonas intestinalis*, *Lamblia* and *Blastocystis hominis*. All these men were subsequently discharged to Australia.

Nematoda.

Dictyocaulus arnfieldi Cobbold.

In 1893 in his report on Stock Diseases in Queensland, Dr. T. L. Bancroft recorded the occurrence of lung worms, *Strongylus micrurus* Mehlis, in sheep and horses. Perrie referred to their occurrence in horses in Sydney, using the same name.

The parasite is almost certainly *D. arnfieldi* from the horse (Sydney and Brisbane) and *D. filaria* from sheep (Queensland). *S. micrurus* (= *D. viviparus*) is the lung worm of calves.

Synthetocaulus capillaris Muller.

Dr. J. B. Cleland forwarded portion of a goat's lung parasitised by nematodes which have been provisionally identified as *S. capillaris* (Sydney District). Only an extremely brief account of the nematode is available to me. Lungworms had not been previously reported as occurring in goats in Australia.

Heligmosomum braziliense Travassos.

About a dozen specimens of this tiny strongyle were collected by Miss B. B. Taylor (Brisbane, May, 1918) from the intestine of a rat, kindly determined by Mr. H. A. Longman, Director of the Queensland Museum, as *Epimys rattus*. This is the only occasion on which *H. braziliense* has been reported from *E. rattus*. I have recorded its presence in *E. norvegicus* in Brisbane and Sydney (1918, p. 56).

Capillaria retusa Raill.

From the walls of the alimentary canal of the domestic fowl in Brisbane—not previously recorded from Queensland though known to occur in Sydney and Melbourne.

Pneumonema tiliquæ Johnston.

This worm was collected recently from the lungs of *Tiliqua scincoides* on Facing Island (Port Curtis) and in the Brisbane District.

Oxyuris tetraptera Nitzsch.

Now recorded from Queensland for the first time, having been found in *Mus musculus* and in *Epimys norvegicus*. In the latter case only one worm, a mature female, was collected. This constitutes the first record of the presence of the nematode in the brown rat which is not mentioned by Dr. Hall (1916) as a host. The specimen (collected by Miss B. B. Taylor, Sept., 1918, Brisbane) agrees in all particulars with the account of the species given by Hall.

Cheilospirura nasuta Rud.

I am indebted to Miss G. Y. James, B.Sc. for specimens of this worm collected from the urodæum of a domestic fowl at West Burleigh, 1918—not previously recorded from this State.

Habronema muscæ Carter.

The occurrence of the adult stage of *H. muscæ* in Australian horses has not yet been recorded, though its presence could be inferred, since the larval stage has been reported to be present in certain flies in N.S.W. and Queensland (Johnston, 1912). The life history has been carefully followed by Ransom (1913).

Bull recently published an interesting account of the occurrence of certain tumours or granulomata in horses, caused by larval *Habronema* in Victoria and South Australia (1916). He believed "swamp cancer" of horses in the Northern Territory to be another form of "habronemiasis." He did not know to which of the three species of *Habronema* infesting the horse these larvæ belonged.

I have re-examined my material labelled as "*Spiroptera microstoma*" and have found that although *Habronema microstoma* appears to be the commoner form in material collected in Sydney and Brisbane, *H. muscæ* was also present in small numbers. Specimens collected in Melbourne many years ago by Mr. A. S. Le Soeuf, on re-examination

were all found to belong to *H. microstoma* as previously recorded by me.

H. muscæ must be added to the list of known entozoa occurring in N.S.W. and Queensland.*

Dr. J. B. Cleland† recorded the presence of *Spiroptera microstoma* in nodules or cavities in dense fibrous tissue in the stomach of horses in West Australia. Both of his records evidently refer to *H. megastoma*‡. Neither *H. muscæ* nor *H. microstoma* has, as far as I know, been noted as occurring in that State.

Gongylonema ingluvicola Ransom.

Last year, Dr. Cleland forwarded some small worm tumours from the walls of the crop and gizzard of a chicken (Sydney District). The causal parasites have been identified as *G. ingluvicola*, which, as far as I know, has been recorded only from a locality in the United States (Ransom, 1904).

ACANTHOCEPHALA.

Centrorhynchus asturinus Johnston.

This parasite, which infests the white hawk, *Astur novaehollandiae* Gm., in North Queensland, was described as a *Gigantorhynchus* but is now transferred to the genus *Centrorhynchus*, the chief characters of which have been summarised by Van Cleave (1916). The male has only three long tubular cement glands instead of several smaller ones as shown in my original figure (1913, pl. 17, fig. 41).

I have identified as belonging to the species a few specimens collected by Dr. J. B. Cleland from a crested hawk, *Baza subcristata* Gd., in December, 1916 at Mummulgum, near Casino, N.S.W., as well as a number in the collec-

*My attention has recently been drawn to a reference in the Scientific Australian (June 1918), where it stated that a paper by Mr. G. F. Hill, dealing with the life histories of *Habronema muscæ*, *H. microstoma* and *H. megastoma*, had been read before the May meeting (1918), of the Royal Society of Victoria.

†Cleland. Diseases of Animals, etc., Bull 33, Dept. Agric. West Australia, 1909, p. 3; Trypanosomiasis, etc. Bull. 34, 1909, p. 15.

‡Desmond (Journ. Agric. Ind. South Australia, 7, 1904, p. 569) referred to the presence of *Sclerostomum hypostomum* in tumours in the stomach of South Australian horses. The reference should be *H. megastoma*.

tion of the Australian Institute of Tropical Medicine, Townsville, obtained in North Queensland from the gray Goshawk, *Astur clarus* (*A. cinereus* Vieill). I desire to thank Dr. A. Brienl, the director of the Institute, for giving me the opportunity to examine his specimens.

The echinorhynch which was mentioned as having been found in *Ninox boobook* (collected by Dr. Bancroft in the Eidsvold District—T.H.J., 1912) is also a typical *Centrorhynchus* sp.

Echinorhynchus rotundocapitatus Johnston.

The presence of this parasite in *Pseudechis porphyriacus* in Queensland is now recorded for the first time; my specimens having been taken from the black snake already referred to as having been killed in the Eumundi district. It frequents the lower three quarters of the intestine though generally more abundant in the rectum.

Hormorhynchus hirundinaceus (*Gigantorhynchus gigas* Gœze).

This is met with occasionally in pigs in south-eastern Queensland—not previously reported from this State.

LINGUATULIDA.

Porocephalus teretiusculus Baird.

A black snake *Pseudechis porphyriacus* from Eumundi—referred to earlier in this paper—was found to be parasitised by the above pentastome, the females being distributed in the lung, while the small males were found at the extremity of the organ. This constitutes the first record of the presence in Queensland of the entozoon, which is now known to infest the following Australian snakes—*Pseudechis porphyriacus*, *Denisonia superba*, *Diemenia textilis* and *D. reticulata*. I have specimens taken from the tiger snake *Notechis scutatus* (Blue Mountains, N.S.W.). Its known range extends from Western Australia to Southern Queensland and to the islands of Bass Strait.

Linguatula serrata Frol.

The larval stage, generally known as *Pentastomum denticulatum*, is now definitely recorded as occurring in the

mesenteric glands of cattle in Queensland, specimens being occasionally found in animals killed in the Brisbane abattoirs.

Acarida.

Cytodites nudus Viz.

This mite is found occasionally in the Brisbane district in the air sacs of the domestic fowl.

Notœdres muris Mégnin.

Though mange mites are not true entozoa, I take the opportunity to record the presence of *Notœdres muris* (*Sarcoptes muris*, *S. alepis* Raill.) in Brisbane and Melbourne on *Epimys rattus* and *E. norvegicus*; in Launceston and Sydney on *E. rattus*; and in Adelaide on "rats" (collected by Dr. J. B. Cleland.*)

I have already referred to its occurrence in *E. norvegicus* in N.S.W. and *E. alexandrinus* in Perth, West Australia. The parasite sets up a warty condition of the tail, ears and sometimes other parts of the head.

Knemidocoptes mutans Rob. causes "scaly-leg" in the domestic fowl in Brisbane.

BIBLIOGRAPHY.

1916 Bull, L. B. A granulomatous affliction of the horse, Habronemic granulomata. Journ. Comp. Path. Therap., 29, (3). (Reprint 15 pp.)

1917 Cherry, T., Bilharziosis, etc. Pamphlet, Defence Dept. Commonwealth of Australia.

1918 Dodd, S. Some observations on the internal parasites of live stock. Agr. Gaz. N.S.W., 1918, pp. 497-507.

1916 Hall, M. Nematode parasites of Rodents, etc. Proc. U.S. Nat. Mus., 50, pp. 1-258.

1910 *a* Johnston, T. H. (Notes and Exhibits) P.R.S. N.S.W., 44, p. xviii.

b ——— On Australian Avian Entozoa. P.R.S. N.S.W., 44, pp. 84-122.

911 ——— Census of Australian Entozoa. P.R.S.Q., 23, pp. 233-249.

---

* Dr Cleland has recently referred to the presence of the parasite in Sydney rats. P.R.S. N.S.W 1918, p. 110.

1912 *a* ———— The internal parasites recorded from Australian Birds, "Emu," Oct., 1912, pp. 105-112.

1912 *b* ———— Notes on some Entozoa. P.R.S.Q., 24, pp. 63-91.

1913 ———— Report on Cestoda and Acanthocephala. Rept. Aust. Inst. Trop. Med., 1911 (1913), pp. 75-06.

1916 ———— Census of the endoparasites recorded as occurring in Queensland, etc. P.R.S.Q., 28, pp. 31-79.

1918 ———— Notes on certain entozoa of rats and mice, etc., P.R.S.Q. 30 (3), pp. 53-78.

1916 Johnston, S. J. On the Trematodes of Australian Birds, P.R.S., N.S.W., 50, pp. 187-261.

1917 Lawton, F. B. *Schistosomum mansoni*. Early clinical features of the disease. In pamphlet "Bilharziosis." See under T. Cherry.

1891 Macalpine, D. Remarks on a fluke parasite in the copperhead snake. P.R.S. Vict., 3, pp. 40-45.

1914 Nicoll, W. Trematode parasites of North Queensland. 1. Parasitology, 6 (4), pp. 333-350.

1918 *a* ———— *Dolichopera macalpini*, etc. Parasitol., 10 (2), pp. 290-3.

1918 *b* ———— The trematode parasites of North Queensland, No. iv. *l.c.*, 10 (3), pp. 368-374.

1904 Ransom B. A new nematode (*Gongylonema ingluvicola*) parasitic in the crop of chickens. U.S.D.A., B.A.I., Circ. No. 64, 3 pp.

1913 ———— The life history of *Habronema muscæ*, etc. U.S.D.A., B.A.I., Bull. 163, 36 pp.

1916 Van Cleave, H. Acanthocephala of the genera *Centrorhynchus* and *Mediorhynchus*, etc. Trans. Amer. Micr. Soc., 35, pp. 221-232.